Topics in Primary Care Medicine

Action Plans in Asthma Management
Why, When, and How?

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The rising prevalence, morbidity, and mortality of asthma have focused national attention on the management of asthma, a chronic inflammatory disorder of the airways. There are about 5,000 deaths from asthma in the United States per year, but the most alarming facts are that the rate is rising and that most of these deaths appear to be preventable.[1-3] Asthma deaths have been attributed to the underrecognition of increasing asthma severity by both patients and their health care practitioners, undertreatment, lack of follow-up care, the failure to objectively measure pulmonary function, and the failure to provide a detailed treatment plan.[4] These observations have received national attention in the public and scientific press and have led to a national call for the development of public health interventions to address the problem of asthma morbidity and mortality in the United States.[3] Preventing death from asthma requires the recognition of those at risk and interventions to reduce risk, including appropriate pharmacotherapy and patient education.[5]

Undertreatment and the lack of a clear treatment plan are two factors that may influence the outcome of the disease.* In one study of asthma management in 111 persons with asthma presenting to an emergency department with acute symptoms, inadequate treatment and lack of a plan were clearly identified as major problems.[6] Nearly 30% of the patients were being treated with a β-agonist agent alone, with no anti-inflammatory therapy at all, and 37% of the sample had no idea what to do in the event of an acute attack (no action plan). Clearly, pharmacologic therapy must be appropriately prescribed in adequate doses, but equally important, patients with asthma require consistent follow-up and a clearly written treatment plan that includes more than a list of medications, doses, and dosing times. If patients are to know what to do when an acute flare of asthma develops, the written treatment plan must include specific directions about how to recognize worsening asthma and when to seek urgent care. To emphasize the behavioral response required, these plans have been called asthma action plans. Because symptoms are often unreliable indicators of airflow obstruction, published practice guidelines advocate the use of peak flow–based action plans in addition to signs and symptoms.[7-9]

Several studies have shown that action plans can be effective methods of asthma self-management that improve pulmonary function and reduce histamine responsiveness, the number of urgent care visits, work or school absences, and the need for a rescue course of oral prednisone.[10-14] Many agree that most patients with asthma can benefit from both verbal individualized advice about asthma and individualized, written self-management plans.[15-17]

What Is an Asthma Action Plan?

An action plan is a written set of instructions for patients and family to guide them in self-managing an asthma exacerbation. The plan can be based on peak flow measurements or key warning signs and symptoms, but may be most effective if it includes a combination of all three. The symptoms of asthma—dyspnea, chest tightness, and wheezing or coughing—worsen during asthma exacerbation but do not directly correlate with increasing airflow obstruction. Therefore, it is important to provide patients with objective indicators as well, such as critical peak flow values and observable signs, including waking at night wheezing, having activity intolerance, and having an escalating need for inhaled β-agonist therapy.

Why Write an Asthma Action Plan?

An action plan helps a patient to know what to do when an exacerbation occurs. National and international practice guidelines advocate partnerships between patients and health care professionals and recommend the use of written self-management plans.[7-9] Although there is no evidence that these written plans can prevent deleterious outcomes in asthma, the possible virtues of an action plan include reduced uncertainty for patients, less delay in securing necessary treatment, an earlier use of corticosteroid therapy for severe exacerbation, and a

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possible reduction in the number of emergency department visits.

When patients are seen in follow-up, a review of the action plan in relation to recent asthma episodes can provide insight about a patient's ability to perceive declines in pulmonary function and effectively institute treatment. When a patient has managed an exacerbation appropriately, it is an occasion for reviewing achievement in self-management. Such reinforcement can promote continued efforts by the patient to adhere to needed daily therapy and enhance feelings of confidence in managing a chronic illness like asthma.[18–20]

Published guidelines for treatment often become community standards of care, especially when the disease is one, such as asthma, that is associated with substantial morbidity and mortality. When patients are informed about signs of increasing airflow obstruction and specific actions to take, they can be effective partners in their own health care.

When Should an Asthma Action Plan Be Written?

All patients with asthma need both verbal and written advice about signs that their asthma may be worsening and what actions to take at home. Initial plans should be provided at the time of the first visit in a clinician's office or at the time of discharge from an emergency department visit or hospital stay. The degree of detail in a plan depends on the patient's understanding and capabilities and on the severity of the patient's asthma. At a minimum, patients should be warned about key signs that asthma may be worsening and when to seek urgent care. Those who experience moderate to severe exacerbations or whose asthma is not under control may require written instructions about short-term changes in treatment. Patients who are capable of more complex self-management and those with more severe asthma need a detailed action plan to direct adjustments in treatment at home. Consultations between patient and health care professional about these adjustments can occur by phone or at the next follow-up visit.

Open communication between the physician and the patient will facilitate treatment and may enhance compliance.[21,22] Careful questioning about the most serious recent episode may elicit the information needed to assess a patient's understanding, skills, and need for more specific education or direction.

How Should Asthma Action Plans Be Written?

Controversy continues about the best method for writing an action plan. One uncontrolled study showed considerable improvement in clinical outcomes in a group of adults with asthma who followed a written peak flow–guided action plan.[12] In another study, substantial improvements in pulmonary function and bronchial responsiveness to histamine occurred in patients who self-adjusted treatment using a peak flow–directed plan, but no improvements were observed in controls.[10] Several studies have compared the use of peak flow–based action plans with one that is guided by symptoms only.[11,13,23] The most recent study showed that patients who were first educated and then used peak flow values to guide the therapeutic plan had fewer acute attacks, fewer days lost from work, and fewer emergency department visits than those who relied on symptoms and physicians' spirometry data.[14] Other investigators have shown no differences in outcomes between groups who used peak flow–based action plans and those who used an action plan based on changes in signs and symptoms; all patients improved substantially.[11,23] The results of these studies suggest that some sort of written plan, based on either symptoms or peak flow values, is better than no plan. According to one recent study, however, routine daily peak flow monitoring without an action plan apparently does little to improve outcomes.[24]

When contemplating whether to use symptoms, signs, and peak flow or a combination of these as a guide, it is helpful to remember that some patients may be poor perceivers of symptom severity.[25–27] The key warning signs of worsening asthma that patients should be educated about include the following[11,23]:

- An escalating need for bronchodilator medications;
- A shortened duration of medication effect, with the recurrence of symptoms within two hours after use;
- Waking at night or early morning with wheezing and difficulty breathing; and
- Important changes in the ability to engage in usual activities.

Instructions should be tailored for each patient and specific to allow the patient to adjust treatment according to a prearranged plan.

Because symptoms can be unreliable, practice guidelines recommend writing action plans based on peak flow measurements. Figure 1 is an example of such a plan.

Green Zone
80% to 100% of predicted or personal best peak flow
- Take your usual daily medications.

Yellow Zone
50% to 80% of predicted or personal best peak flow
- Use bronchodilator (2 puffs); recheck your peak flow in 20 minutes; if not improved, repeat 2 more puffs of bronchodilator.
- Other medications.

Red Zone
50% of predicted or personal best peak flow
- Medical alert! You need immediate treatment. Use your bronchodilator and call your doctor; if not available, go to the hospital right away.

If your bronchodilator lasts only 30 minutes or you have difficulty talking, go to the emergency department immediately!

Figure 1.—A sample asthma action plan based on peak flow is shown. See text for a more detailed description of the green, yellow, and red zones.

To use the zone system, the ranges must be calculated by a clinician and written out for each patient. The green zone means "all clear, continue as usual," and the variability of peak flow is usually less than 20% from night to morning. The yellow zone means "caution, action (medication) needed" because the peak flow is 50% to 80% of the patient's best value, and variability is 20% to 30%, often with increased signs and symptoms—nocturnal symptoms, coughing, wheezing, chest tightness with activity or at rest, and a decreased ability to engage in usual activities. Peak flow values in the yellow zone indicate an acute exacerbation, or a slow deterioration, of asthma that is not under good control. Increased doses or frequency of medication are usually needed. For certain patients, it has been recommended to divide the yellow zone into high yellow and low yellow zones to provide a more detailed and individually refined plan.[28] The red zone means "medical alert, urgent treatment needed," with the peak flow less than 50% of the patient's personal best. In this zone, asthma symptoms often are present at rest and greatly interfere with activity. Patients are instructed that lack of a prompt response to home treatment at this point means urgent medical care is needed, preferably at a hospital emergency department.

Other modifications of the three-zone plan are possible. Patients whose best peak flow is less than 300 liters per minute may benefit from a more conservative plan, with the green zone specified at 90% to 100% of the patient's best. Still others may not need to initiate treatment until the peak flow drops to 70% of the personal best. The action plan can be modified to meet the needs of each patient.

The plan need not be complicated or detailed if a patient has newly diagnosed asthma or has rare exacerbations. A simple directive may suffice about what to do if the patient wakes at night wheezing or has a peak flow below a specified critical level. For more experienced patients who are capable of self-managing and controlling their asthma, a specific set of instructions for the yellow zone may include increasing the doses of bronchodilator to two puffs every 20 minutes, repeating three times, and recording the peak flow value before and after each dose. After three such doses over the span of 60 minutes, the peak flow should return to the green zone or show a consistent upward trend. If it is not improving or is falling, the patient is instructed to call the clinician or to be seen for an evaluation. The British asthma guidelines also suggest another step: doubling the dose of the inhaled corticosteroid agent at a certain level of the peak flow, for example, at 70% of the best value or at the first signs of a developing cold.[29]

How Should Written Instructions Be Provided?

The action plan should be tailored for each patient. Whenever a written plan is provided to a patient, remember to document the written directives in the medical record to ensure continuity of care from other health care professionals who may interact with the patient. The following are examples of asthma action plans for patients with newly diagnosed asthma and asthma of varying severity:

Patient With Newly Diagnosed Asthma

Sheila is a 27-year-old secretary recently diagnosed with asthma that is not yet well controlled. She currently has symptoms during the day and seems frightened and overwhelmed by her diagnosis. Figure 2 shows a simple action plan that might be easiest for her to follow.

> Your asthma will improve slowly with regular and consistent use of your prescribed medications. But if you should notice that the effects of your inhaled bronchodilator [name of medication] do not last longer than 1 hour, and you are unable to perform your usual activities or to sleep because of symptoms, call your physician at [insert phone number] or come in to the office. If you have difficulty talking and breathing is becoming harder, go directly to the emergency department.

Figure 2.—A sample action plan is shown for patients with newly diagnosed asthma.

Mild Exercise-Induced Asthma

Jane, a 17-year-old competitive swimmer with asthma, says that her swim workouts are interrupted by wheezing. Figure 3 shows a simple preventive plan that might be adequate for her.

> 20 to 30 minutes before your exercise workout, take 2 puffs of your bronchodilator [name of medication]. Take 2 more puffs at the end of the workout if you are still wheezing. If your breathing does not improve with medication and rest and it is difficult to talk, call your physician at [insert phone number] or go to the emergency department.

Figure 3.—A sample action plan is shown for patients with mild, exercise-induced asthma.

Moderately Severe Asthma Well Controlled With Inhaled Steroid Therapy

Joe, a 40-year-old business executive, has had asthma for ten years. He began having daily symptoms about a year ago, requiring continuous treatment with daily inhaled corticosteroid and rescue inhaled β-agonist. Although his asthma is currently well controlled, he has occasional exacerbations with increased symptoms and had an emergency department visit a month ago. He will require a more detailed asthma action plan, such as shown in Figure 4.

Severe Steroid-Dependent Asthma

George is a 50-year-old businessman whose asthma

Green Zone

All clear. Your peak flow should be 80% to 100% of your personal best; for you, that is _____. You should not have symptoms that interfere with your sleep or usual activities. Take your regular daily medications as prescribed.

Yellow Zone

Caution! Your asthma has worsened and requires attention. Your peak flow may be 50% to 80% of your personal best; for you, that is _____. You may have been awakened from sleep with asthma symptoms and may not feel able to participate in your usual daily activities. Actions:

- Take 2 puffs of your bronchodilator [name of medication] now.
- Wait 20 minutes and check your peak flow. If not improved, take 2 more puffs of_____and repeat your peak flow.
- If not improved, repeat step 2. Your peak flow and your breathing should be improving, but if not, take the following medication [name of medication] and call [phone number].

Red Zone

Medical alert! You need immediate medical attention. Your peak flow is less than 50% of your personal best; for you, that is _____. Take 2 to 4 puffs of your bronchodilator [name of medication] plus [name of medication]. Go directly to the emergency department.

Figure 4.—A sample action plan is shown for patients with moderately severe asthma that is well controlled with inhaled steroid therapy.

has steadily worsened over the past six years despite maximal therapy. He now requires daily oral corticosteroid therapy in addition to daily inhaled steroid and β-agonist use. He has had about one emergency department visit in the past month for acute exacerbation. Figure 5 shows the asthma action plan that would be appropriate for such a patient.

Summary and Practical Tips for Writing and Using Action Plans

Written action plans help patients with asthma manage exacerbations at home or work. They may be written in a number of ways and tailored to each patient's personal profile. Although there is no evidence as yet that action plans can have an effect on asthma morbidity and mortality, several possible benefits have been reviewed. The following are practical suggestions for clinicians caring for persons with asthma to write effective action plans:

- Ask the patient what are the earliest signs of an asthma attack for him or her and how the symptoms typically progress. Use these to personalize the action plan.
- Teach the patient how to use a peak flow meter correctly, and check technique often. Compare trends in peak flow for an individual patient on the same brand of peak flow meter, if possible, because there is consistency only within a given brand.[29]
- Determine the patient's personal best peak flow after a trial of optimal therapy (consider a short course of prednisone). The patient's personal best may be more useful than the predicted value, but keep in mind that it can improve with optimal therapy or decline with fluctuations in the disease or substantial aeroallergen or toxic exposures. Use the personal best as the target goal to provide reinforcement. Use the predicted value if the personal best peak flow is not known.
- When a patient follows the plan appropriately, give lots of feedback and praise. Overall compliance often improves with direct positive reinforcement.
- Consider scheduling a "telephone consultation hour" when you are available for advice about implementing the written action plan. Instruct patients to measure their peak flow just before calling and have all current peak flow

Green Zone

Asthma stable. Your peak flow should be at or above this value:_____

- Take your usual daily medications as follows:

_____

_____

_____

High Yellow Zone (Mild Flare)

Your peak flow may have dropped to 70% to 90% of your usual best; for you, this is _____. Your symptoms may have worsened slightly. Actions:

- Take _____ puffs of your bronchodilator _____. Check your peak flow in 20 minutes. Your symptoms should be resolving, and your peak flow should be improving. If not, repeat _____ puffs of the bronchodilator and recheck your peak flow.
- You may repeat the above step twice. Symptoms should resolve, and peak flow should improve.

Low Yellow Zone (Moderate Flare)

Your peak flow may have dropped to 50% to 70% of your usual best; for you, this is _____. Your symptoms may have worsened substantially, and your sleep may be interrupted by asthma symptoms. Actions:

- Take _____ puffs of your bronchodilator [name of medication] and _____ puffs of the inhaled steroid [name of medication].
- Take _____ tablets of your oral steroid [name of medication].

Red Zone (Severe Flare)

Medical emergency!

- Take _____ puffs of your bronchodilator [name of medication], _____ tablets of your oral steroid, and go directly to the emergency department. If you are having trouble talking or walking, call 911 for immediate transport to the nearest hospital.

Figure 5.—A sample action plan is shown for patients with severe, steroid-dependent asthma.

information handy. Make sure the action plan has a phone number to call at any hour in an emergency.

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